

WST2

Washington State Technology Transfer



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**Washington State
Department of Transportation**

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Issue 83, Summer 2004

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Editor reserves the right to refuse to publish and to edit articles
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The opinions expressed in articles are not necessarily those
of the editor.

Cover photo: *This photo is of college students crossing the busy intersection of Cordata Parkway and Kellogg Road in Bellingham, Washington. After the fall of 2004, this busy four-way stop controlled intersection will see major improvements that promise to improve pedestrian and bicycle safety as well as decrease delay for motorists. Adjacent to this intersection is Whatcom Community College, with over 9,000 full- and part-time students of which a significant percentage walk, bike, and use transit to reach the college. If you would like to know what major improvement could possibly benefit both non-motorized and motorized transportation, keep an eye out for the fall issue of the WST2.*

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The acronym TRAIN stands for Training Resource And Information Network. TRAIN is a network of interagency training departments in Pierce, Thurston, and Kitsap Counties sharing training resources. This site will be used to post news about TRAIN and to post training opportunities and available classes for agencies within the three counties.

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WST2 Center Listservs are the ultimate information exchange tool. Enjoy!

From the Editor's Desk



*Brian Walsh, P.E.
Technical Services Manager,
WSDOT Highways &
Local Programs*

During the second week of June, I had the timely opportunity to join our counterparts at the Local Technical Assistance Program (LTAP) meeting. Region 10 and Region 9 were represented at the two-day meeting in Portland, Oregon. Hosted by the Oregon LTAP (T2 Center), the event gave me the opportunity (in my short time working with technology transfer issues) to meet our sister states' representatives and gain first-hand knowledge on how other states assist local agencies with guidance and technical expertise, and how they utilize funding from the National LTAP Program. For those of you interested in how LTAP is organized nationally, there are 10 regions. Region 10 includes Washington State, Oregon, Idaho, Alaska, and the newest member, Utah. Region 9 includes Hawaii, Nevada, Arizona, and California.

What intrigued me (as the newest LTAP member in our Region) was the genuine desire of all the LTAP Center staff and managers to stay focused on providing a consistent program nationally, while retaining the right for each state LTAP Center to tailor parts of the program to serve its interests and needs. With 51 LTAP Centers around the country (six additional Centers being TTAP Centers – Tribal Technical Assistance Program), the challenge is to take what resources you have with LTAP funding and leverage additional resources to serve your constituency, which are the local agencies that are looking for transportation related technology that can be applied to improve their community infrastructure.

Our own Washington State LTAP Advisory Committee met last February and discussed a number of issues we wanted to see our Washington State LTAP (WST2) focus on. Two of those issues were safety and workforce initiatives. Workforce includes training, retention, and recruitment. As part of the National LTAP mission, both of these focus areas are in the master plan.

The national statistics are sobering in that almost half the technical workforce will retire in the next 15 years or less. The need to reach out and attract engineers and technicians in all sorts of ways is imperative. At the Region 10 and Region 9 meeting in Portland, I learned that there are some innovative ways in recruiting students into the transportation field that are beginning to bear fruit. Alaska LTAP, located in Fairbanks at the University of Alaska, has a great workforce program that their LTAP Center director shared at the meeting. In the same vein, Washington State has begun the first stage of setting up a committee that will create a plan to get internships established within the public and private sector of transportation, beginning with college and community college students. If you were like me, I wasn't sure where I was headed between the period of finishing high school and the first few years of adulthood. Since a member of my immediate family worked in transportation, it was pretty clear to me that one could make a living working with the infrastructure. I feel fortunate that I was exposed to the transportation field at that critical time in my life.

If you would like to share your thoughts on the subject of recruiting students into the transportation field, please email me at walshb@wsdot.wa.gov. Have a great summer, drive safely, and don't ever stop marveling at how important transportation is in your life.

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The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Technology Transfer (T2) Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.

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Washington State
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2004 Pacific Northwest Transportation Technology Expo

*By Larry Schofield, P.E., Technology Transfer Engineer,
Washington State Department of Transportation
(WSDOT), Highways & Local Programs' WST2 Center*

The fourth Pacific Northwest Transportation Technology Expo was held May 18-19, 2004 at the Grant County Fairgrounds in Moses Lake, Washington. WSDOT's Highways and Local Programs and WSDOT's Maintenance and Operation Division, as well as FHWA, sponsored this popular event. Over the course of two days, there were over 600 attendees at this year's event.

On display were 50 "Better Mousetraps" or innovative, homegrown ideas for roadway operations developed by WSDOT and local agency transportation operations staff. Among the most popular exhibits were assorted wing plow warning devices and illumination systems, including the use of LED loops mounted on machinery. H&LP's WST2 Center requested Expo attendees vote for the best, most innovative, and most cost saving mousetrap from the equipment and tools categories. This year's Crystal Mouse award winner in the equipment category was WSDOT Eastern Region's Guidepost Hole Puncher, and the winner in the tool category was WSDOT South Central Region's Guardrail Sign Mount that enables users to put work zone and other temporary signs along the roadway using the guardrail W-beam as the support. Both of these mousetraps will be featured in a future edition of the WST2 newsletter.

Local agencies were well represented at this year's Expo. Seven local agencies displayed nine different mousetraps:

- Douglas County displayed their truck mounted posthole digger and their chip seal centerline marker installer.
- The City of Issaquah displayed their modified sanding truck.
- Okanogan County displayed their water truck surfactant injection system.
- The City of Oak Harbor displayed their scarifier/grinder transporter.
- The City of Vancouver displayed their catch basin grate puller.



View from the grandstand.

- The City of Tacoma displayed their drop cone holder and their concrete saw trailer.
- From our neighboring state of Oregon, Multnomah County displayed their incident response truck and trailer.

H&LP's WST2 Center is building a searchable database containing mousetrap names, contact information, pictures, and eventually, streaming video of this year's event. The database will also contain available information on mousetraps brought to previous years' Expos.

Commercial exhibitors displayed and demonstrated their equipment and safety items at this year's Expo. One of the more popular and entertaining demonstrations was Kemp West's All Terrain Excavator-Spyder shown below.



Kemp West's All Terrain Excavator-Spyder.

WSDOT and FHWA provided training to interested Expo participants. WSDOT provided two training sessions on equipment tie down and wing plow operation. FHWA provided four training sessions on ROV inspection, sign retro-reflectivity, inspection of ground anchors/soil nails, and dust abatement. Also on display was the work zone memorial honoring those who lost their lives in the line of duty.



Photo 1. Douglas County's Sign Truck is complete with a post-hole auger to make installing signposts fast and easy using the truck's hydraulic twist.



Photo 2. City of Oak Harbor Street Maintenance Crew brought a platform and ramp for a scarifier/grinder with a trailer hitch for easy loading and unloading.



Photo 3. Close-up of City of Vancouver's Catch Basin Grate Remover.



Photo 4. An injury to a worker prompted fabrication of these Drop Cone Holders by Brad Bloodgood, City of Tacoma.



Photo 5. City of Tacoma's Concrete Saw Trailer holds a 600-gallon dual compartment water tank, a winch, hoses, and the saw in one compact unit. (See article in WST2 Issue 79, Summer 2003, pp. 28-30.)



Photo 6. City of Issaquah increased the efficiency of their sanding operations with this sander modification.



Photo 7. Douglas County's crew brought a Chip Seal Centerline Marker Installer.



Photo 8. Members of the Expo committee and work crew took a quick break for a group photo. A big "Thanks" goes out to them for their hard work and dedication to make the 2004 Expo a great success!

Elimination of Temperature and Density Differentials: The Cyclic Density Specification

Reprinted from "TECH NOTES," a publication by the Washington State Department of Transportation (WSDOT) Environmental & Engineering Program Materials Laboratory to share design and construction technology gained from projects done throughout WSDOT.

Since 1995, WSDOT has performed research on temperature and density differentials in Hot-Mix Asphalt (HMA) pavements. Temperature differentials are formed during transport of the HMA to the paving project. As the mix is transported, a crust develops on the HMA surface, which, if not remixed with the hotter, underlying mass of HMA prior to placement, becomes concentrated in relatively small areas in the mat (Figure 1). These areas are near cessation temperature and tend to resist adequate compaction.

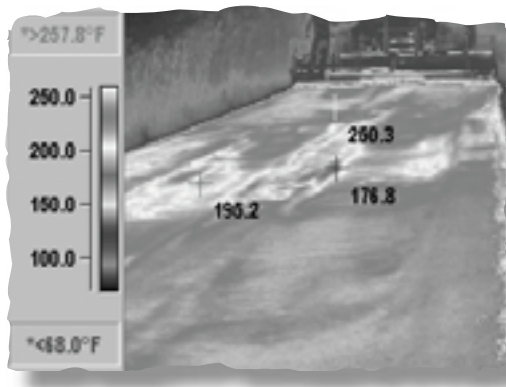


Figure 1. Temperature differential in HMA mat.

The result is a mat with a cyclic pattern of small low-density, open-textured areas that tend to deteriorate more quickly than the rest of the pavement (Figure 2). Although these areas can be small, they can significantly shorten the life of the pavement.



Figure 2. Cyclic pattern of low-density, permeable areas.

This research has led to the implementation of a cyclic density specification that has been in use on specified WSDOT projects since 2002. This specification purposely targets temperature differentials in an attempt to identify their occurrence and eliminate them during construction.

The testing program uses temperature differentials as an initial indicator of potential low-density areas and proceeds in three basic steps:

- An infrared camera or infrared temperature gun is used to locate temperature differentials.
- If the temperature differential between a particular location and the surrounding mat is 25°F

or greater, nuclear density testing is performed at the cool spot's location.

- If densities are verified as unacceptably low and there is a minimum of four locations per density lot, a penalty of 15 percent of the HMA unit price is assessed.

On projects where this specification has been used, the occurrence of temperature differentials

and their resulting density differentials has been dramatically reduced. For instance, the specification was used on 13 projects in 2003. Of these projects, 12 utilized a material transfer vehicle (MTV) from the start of the project and had temperature differentials in the 8° to 15°F range. The one project that did not utilize an MTV at the start of the project failed the cyclic density specification during the first two days of paving. An MTV was placed in the paving train and temperature differentials and visible segregation were drastically reduced. The goal is to implement the specification statewide.



For more information, contact Kim A. Willoughby, WSDOT Materials Lab, at (360) 709-5474 or at willouk@wsdot.wa.gov.

Rehabilitating Our Nation's Bridges

Maintaining bridges is no small task. Here's how we make decisions about repair and technology that will help them last longer.

By Joe Nasvik

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According to the Federal Highway Administration's (FHWA) National Bridge Inventory (NBI), 591,061 bridges in the United States are more than 20 feet long. Of this total, 360,446 (61 percent) are constructed of concrete and 194,827 are structural steel (33 percent). The rest are wood, masonry, aluminum, or other materials. Currently 29 percent of the concrete bridges and 55 percent of the steel bridges need repair, and 81,543 bridges are obsolete and need to be replaced.

The average age of bridges in the United States is 40 years. Paul Kivisto, the metropolitan region bridge engineer for the Minnesota Department of Transportation (MinDOT) says, "The average life of a bridge is approximately the same as for a person—about 70 years." Whether a bridge makes it that long or exceeds its life expectancy depends on how well it's maintained over its life span—the same as for people.

To ensure that bridges are safe and maintained, the federal government enacted legislation in 1969 mandating inspections by qualified engineers every 2 years for all bridges in the country that are more than 20 feet long. The FHWA has the responsibility to see that bridge owners comply.

The timing and the type of bridge inspection depends on several factors: its age and size, the amount of traffic it carries, the role it plays in relation to cities around it, and the access it provides to emergency facilities. An accident triggers an immediate inspection.

The Evaluation Process

Niket Telang, a senior engineer with Construction Testing Laboratories (CTL), Skokie, Ill., explains that there are two types of federally mandated inspections: routine and in-depth. Routine inspections are the most common, involving only a visual inspection. They document areas of noticeable damage and signs of distress. In-depth examinations are much more rigorous and "hands-on." Inspectors literally run their hands over an entire structure and perform more sophisticated testing where it's needed. Bridges with a history of problems are inspected annually, and large important bridges have assigned inspectors who inspect them continuously.

A small bridge inspection requires two inspectors working 3 to 5 days to finish the onsite portion. Large bridges involve larger teams. Not all team members must be engineers, but each member is trained and certified. The leader of a team is always a structural engineer who isn't required to be on the

site of an inspection but must sign-off on the inspection. States and counties conduct inspections "in house" if they have enough staff; otherwise they hire consultants. Consultants almost always perform the underwater inspections of piers and footings. The NBI includes guidelines for rating bridge conditions.

Setting a Course

"When bridge inspections are complete, the next step is to decide which will be repaired and which won't. Engineering decisions are now interfaced with budgets and political constraints," says Telang. The most important problems get funding. Adrian Ciolko, vice president of CTL, adds that over the past few years many bridges were marked for removal and replacement, so they weren't to be repaired. But in today's downturned economy, there is a new interest in rehabilitating them. And when there is no money to fix a bridge, owners have the option to close it. So, currently there are thousands of closed bridges around the country.

When money is allocated for a project, design teams create plans, predict costs, and recommend techniques for repairs. They finish their task by completing drawings, specifications, quantities, and cost estimates, which become the bid

documents for a project. Kivisto adds that in Minnesota, if the expected cost for repairs exceeds 70 percent of the cost of a new bridge, they replace it.

Telang states that it's not always the low bid that gets the work. Contractors must frequently submit their qualifications with their bid, and the low bid may not be qualified.

Trends in Repairs

In terms of frequency, bridge decks are the most repaired element, mostly due to chloride penetration from deicing salts that cause spalling and corrosion of the steel reinforcement. Ralph Anderson, director of bridges for the Illinois Department of Transportation (IDOT), states that salt damage is a big concern because IDOT frequently salts bridges in preparation for snow, so they won't become slippery when snow starts to fall.

Chloride-induced corrosion problems in marine settings are also common—the salt source being the ocean rather than deicing salts. Next in line are superstructure issues involving beams, trusses, stringers, and cross frame members. Piers are next, followed by curbs and guard rails.

The goal for repairs is to add to the life expectancy of a bridge. But decisions about which methods

and products to use also consider the public disruption involved, effectiveness over time, and the extent of the deterioration.

Proactive maintenance is beginning to receive more attention because problems are less expensive to fix when they are first developing. In that light, electronic monitoring holds good promise.

Tom Weinman, manager of the sensors and diagnostic group for CTL, says that there are interesting bridge projects around the country that demonstrate this approach. Monitoring chloride penetration is easy for electronic sensors, which can be installed on new construction or retrofitted.

Sensors also can be embedded in sacrificial overlays to measure chloride penetration through the topping. The readings help owners know when it's time to remove and replace the topping in order to avoid chloride damage to the structure. "And by monitoring corrosion in steel reinforcement, you can add inhibiting admixtures such as calcium nitrite—and then monitor how successful the effort was," he adds.

Where Do We Go From Here

Joey Hartmann, a research structural engineer with the FHWA's Turner-Fairbank Highway Research Center, thinks the most important trend in bridge

construction and maintenance is the shift from construction costs to life cycle costs—how much a bridge really costs over time. This holistic approach includes upfront corrosion or deterioration protection strategies, inspection technologies, and maintenance methods.

"We will build bridges in the future that are more resistant to deterioration and easier to both inspect and maintain," says Hartmann. "Nondestructive evaluation technologies will be incorporated into bridge components that provide more detailed, quantitative information than the subjective information provided by current hands-on engineering inspections. Also, the use of alternate forms of reinforcement that are less susceptible to corrosion in concrete bridge decks will increase."

One promising experimental study Hartmann is doing involves eliminating the need for mild reinforcing steel from the concrete bridge decks. Concrete bridge construction will continue to have significant funding, and its use will be increased.

▲
—Nasvik is a senior editor with Concrete Construction magazine, a Hanley Wood publication. This article originally appeared in the December 2003 issue of Concrete Construction.



By Bob Brooks, WST2 Pavement Technology Engineer, Washington State Department of Transportation (WSDOT) Highways & Local Programs (H&LP) WST2 Center. Derived from *Perpetual Pavement, Two Years Later* by Tom Kuennen, *Better Roads*, March 2004

Perpetual pavement projects abound across the United States. At least 10 state DOTs have been involved in constructing these projects in the last two years, including an I-5 reconstruction project near Albany, Oregon. As with many of these projects, the I-5 project involves the rubblization of the existing concrete surface, followed by 12 inches of layered asphalt.

Perpetual pavement concepts are not new; they have been proven to work over time. In 2003 the Asphalt Pavement Alliance (APA) announced Perpetual Pavement Awards to seven DOTs. The criteria for these awards were that the asphalt pavements are a minimum of 35 years old, have never had a structural failure, and have not been overlaid more than an average of every 12 years.

A perpetual pavement is defined by the APA as a pavement designed and built to last longer than 50 years without requiring

Perpetual Pavements— The Time Has Come

major structural rehabilitation or reconstruction and requiring only periodic surface renewal to correct distresses confined to the top layer. Perpetual pavements are designed using mechanistic principals. Mechanistic design principals analyze how traffic stresses induce strain that affects pavement performance and take into account material qualities and layer thickness.

Perpetual pavements are designed with thick asphalt layers intended for different purposes, with a sacrificial surface course. The surface course is planned to be periodically cold-milled and overlaid with more Hot Mix Asphalt (HMA) to restore the driving surface. Perpetual pavements are designed to prevent fatigue cracking, so they are designed from the bottom up. The lowest layer is designed to resist bottom-up fatigue cracking, the middle layer is designed to support traffic loads, and the top layer is the sacrificial surface course. The surface course can be any HMA but is often a Stone Matrix Asphalt, Open Graded Friction Course, or Superpave mix.

Perpetual pavements are often placed over deteriorated portland cement concrete pavements that have been cracked and sealed or rubblized. This makes an excellent foundation for the asphalt layers and can help reduce layer thickness.

The goal of the mechanistic design is to keep the stresses and strains in the bottom asphalt layer below the 70-microstrain figure, thus avoiding bottom-up fatigue cracking that can work its way throughout the pavement layers. Research and field demonstrations have shown that keeping the tensile strain in the bottom layer below the 70-microstrain level can prevent fatigue cracking regardless of the number of load repetitions.

Designing a perpetual pavement requires mechanistic analysis, and that job has been made a lot easier with the preliminary introduction of new design software titled *PerRoad 2.4*. National Center for Asphalt Technology's (NCAT) Dr. David H. Timm, an assistant professor of civil engineering at Auburn University, developed this software, and it is available for free downloading from the APA web site at <http://www.asphaltalliance.com/news.asp>.

The software performs two levels of analysis. First, a deterministic analysis is performed based on nominal design values like stiffness and tire load. Secondly, a reliability analysis is performed that



Perpetual Pavement Layer Design.

predicts the amount of risk associated with a particular design. A designer will define a trial pavement structure, including number of pavement layers, material types, material properties, variability, and perpetual pavement thresholds. Then climate information, length, and material properties for each season, as well as anticipated loading are entered and pavement responses are calculated. If any user-defined perpetual

pavement thresholds are exceeded during the calculated design life, then the trial pavement structure is judged to be non-perpetual. Adjustments can then be made to the design layer thickness and the calculations re-run until the pavement responses are below the threshold. Lastly, a cost analysis can be performed to estimate the lane-mile costs associated with the final pavement structure design.

As might be expected, perpetual pavements have proven to be more expensive than traditional HMA pavements, but are still significantly less expensive than concrete construction. Given the anticipated pavement life, at least 50 years with only occasional surface restoration required, in the right location these long-lived pavements can be a cost-effective consideration. This gives the pavement designer yet another tool for the toolbox.



Retired Professionals: Ready to Work for You

Need help with a special project? Need the skills and experience of a public works professional? The Washington State Department of Transportation Highways & Local Programs' WST2 Center's database of Retired Professionals may be just what you need. It is a skills bank of professionals with expertise in maintenance, operations, engineering, inspection, construction, and surveying, just to name a few. You can browse through the listings from the T2 home page:

<http://www.wsdot.wa.gov/TA/T2Center/T2hp.htm>
Click on Retired Professional Program

We would like to increase the awareness of this program. We encourage you to tell your staff and soon-to-be-retired employees about this program. We would like to see this skills bank grow and become a strong, extensive, and useful resource for agencies when there is a need for outside professional help.

Are you retiring soon? Want to continue with part time, full time, or occasional employment? You can now enter your resume directly online by going to:

http://fmapps.wsdot.wa.gov/retired_professional_reviewer

Enter all of your information and give yourself a Retiree Identifier that will allow you, and only you, to return at another time to make changes to your record. Then, click the register button. A window will pop up asking for a User ID and Password. You should enter:

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This will be the only time you enter the User ID and Password.

Your resume will be sent to Laurel Gray for review and posting to the web. If you prefer, you can access the first web site above for a hard copy of the form to send to the WST2 Center.

If you have questions, contact Laurel Gray at (360) 705-7355 or GrayL@wsdot.wa.gov.

Livability Today—A Reflection

Reprinted by permission from the Partners for Livable Communities

The state of the American community has always been the mission of the *Partners for Livable Communities*. Running like a thread throughout its almost twenty-five years of programs across America and abroad—workshops and seminars, technical assistance and training, research, networking, and publications—has been Partners' enduring focus on livability as the goal of community development.

But what exactly do we mean by "livability" today?

Partners has been persistent in its attempts to define livability. But the particulars of livability have proven to be elusive, subjective, local. There are four broad phases in our expanding definition of livability:

Phase 1: Pride and the Willingness to Work

Livability is the product of effort and energy. Livability is a process of change, the ability of communities to see what their problems (and assets) are and to pitch in—as communities—to make them better.

Partners concluded that the real test, the real measurement of livability, asks only two essential questions:

1. What do people take pride in about their community?
2. How hard will they work to protect the community assets they treasure?

What makes a city livable, *Partners* concluded, is old-fashioned pride and a willingness to work to preserve assets.

Phase 2: Jobs and Teamwork

"Jobs" was shorthand for the recognition that the changing U.S. economy was giving a competitive economic advantage to places that are attractive to live in. Employers are becoming increasingly foot-loose and they tend to seek locations that attract residents.

Partners came to view civic achievement as the result of civic action—that is, as neither the government's job nor the private sector's job but as everyone's job. Teamwork involving government agencies, community groups, civic and cultural and philanthropic organizations, business groups, and advocates for the environment was behind the most notable accomplishments in these cities. Another common factor in the successful communities was an entrepreneurial leadership style that emphasized action, results, innovation, responsiveness, and multiple (and nontraditional) funding sources. Calling such teamwork and entrepreneurship the "New Civics," *Partners* added it to the tenets of its expanding definition of livability.

Phase 3: Human Development and Regional Solution

These communities were cited for commitment to programs for children, growing real family income and a low poverty level, coordinated economic development activities in six counties, long-term regional urban growth policy, solve problems of homeless individuals and families, balancing downtown neighborhood revitalization, and a holistic approach to breaking the cycle of poverty and welfare dependency.

That experience convinced *Partners*, as we reported in 1994 in *The State of the American Community*, "that livability is more than a matter of physical design, more than a matter of amenities. It is a matter of essentials—safety, health, jobs, justice, environmental concerns—that build a sense of community and of individual worth within the community. Without these essentials, amenities become frills and quality of life an empty concept."

Broad environmental and resource issues, *Partners* reasoned, involve many nonlocal factors that are most effectively addressed in a regional context. Our 1991 State of the Region forum had a scope-broadening purpose: to look at a broader definition of the quality of life and livability that would include such criteria as social welfare, economic development, environmental health, and family concerns.

Phase 4: Community Empowerment

Revisiting all of its earlier attempts to define livability, *Partners* now arrived at a definition that combines many of their elements: a place-based people strategy, as described in its Community Empowerment Manual. Cooperating for Change, *Partners* learned, involves participation from all segments of the community, an inventory of the community's assets and liabilities (physical, economic, cultural, and environmental), leadership, goal setting, and action plans. This program also revealed the importance of thinking regionally, even while working to build community livability from the neighborhood up.

Mobilization for Change

Partners takes a practical approach to livability. Instead of building its campaigns to raise public awareness of livability issues around a generalized idea or definition of livability, *Partners* lets livability initiatives speak for themselves. It sees its role as helping them get heard. Specific ideas for community improvement are being put into practice all over American and abroad. *Partners* has established a strong network linking all sorts of community builders—public officials and agencies, civic organizations, cultural institutions, nonprofit advocacy and service organizations, and even individual activists. A central purpose of this network is to develop and publicize a continually expanding set of “best practices” for livability through the testing refining, and analysis of local initiatives and programs.

Now that livability is on everyone’s mind, what does *Partners* say when people ask, “What’s a livable community?”

We might describe a livable community as one that:

- Stimulates the physical, mental, and spiritual potential of individuals.
- Fosters good schools, jobs, housing, public transportation, clean air, and safety.
- Encourages a harmonious relationship between man and nature.
- Helps conserve energy and natural resources.
- Brings quality to the physical, social, economic, and cultural environment.
- Encourages a variety of choices and opportunities (balance) among new and old, large and small, intensive and quiet, communal and private.

- Takes advantage of its unique features—climate, geography, population, history industry—and express them through design.
- Understands a community’s roots.
- Develops a participatory attitude, to involve people in the planning and use of projects.

What is interesting about that list is that it is made up of attitudes, not physical characteristics. Thus, while it is possible to draw up a basic set of attributes that enhance the lives of any community’s residents, those attributes will be different, in detail and in kind, everywhere. What makes a community livable is the people who live in it, their pride in local assets, and their willingness to work to preserve them. Ultimately, livability is an attitude, a state of mind, an approach to community.

Or in *Partners’* context, an agenda. But livability is not simply a transportation agenda, or a “smart growth” agenda, or an agenda for jobs or the environment. Livability reaches broader and deeper. It is a balanced agenda that takes into account local assets and preferences. As a tool for economic development, it benefits all segments of a community’s resident population, it takes place on a broad (regional) playing field, and it is based on strategic planning. The short version: **Livability is a place-based people strategy. Or, if you prefer: Livability is mobilization for change.**

In that spirit, we can set down some general principles of achieving livability that communities can use as they define and carry out their own visions.

- Always keep in mind that livability for all depends on an equitable distribution of the good life.

- When opportunity knocks, answer. Nothing creates a better opportunity for change than a disaster, but short of a disaster, communities can create their own opportunities through envisioning a better future.
- Treat people as the most important resource of any community project. Innovative ideas and the willingness to take risks originate with individuals. Leadership is contagious and should be passed to as many people as possible.
- Involve the whole community. First tackle those issues that unite you and then work together on the issues that divide you. The collaboration of strange bedfellows in a common cause helps to empower a community. Approach problems entrepreneurially and with a sense of confidence.
- Consider quality of life as a strategy, not a luxury. It pays off by attracting residents and businesses. Place—people’s love of place and sense of place—triggers action. The aim of community action is to enhance place. Cultural, spiritual, and artistic initiatives can move people’s imagination and bridge the differences among them.
- Get to work. Manage the community change process for maximum effect. The planning process itself should be intelligently managed. In other words, plan the planning. Be wary of taking on more than can be handled well. Build up incrementally on the foundation of small initial successes.
- Start positive and stay positive. Declare success frequently.



New Reporting Legislation Affects Cities

By Bob Brooks, WST2 Pavement Technology Engineer, Washington State Department of Transportation (WSDOT) Highways & Local Programs (H&LP) WST2 Center

In April 2003, the legislature passed the Transportation Efficiencies Bill (SSB 5248). This bill establishes planning and preservation strategies for state and local transportation networks. Among other provisions of the bill is a requirement for cities to report pavement condition data on their arterial streets beginning with the current 03-05 biennium. That section of the bill is shown below.

{+ NEW SECTION. +} Sec. 305. A new section is added to chapter 46.68 RCW to read as follows: During the 2003-2005 biennium, cities and towns shall provide to the transportation commission, or its successor entity, preservation rating information on at least seventy percent of the total city and town arterial network. Thereafter, the preservation rating information requirement shall increase in five percent increments in subsequent biennia. The rating system used by cities and towns must be based upon the Washington state pavement rating method or an equivalent standard approved by the transportation commission or its successor entity.

Although this legislation places an additional reporting requirement on cities and towns, it also provides an opportunity for improved efficiency in the management of city pavement networks by promoting the use of pavement management systems. Additionally, this also provides an avenue for cities to document and communicate their pavement preservation needs to "get their story told."

Washington State Department of Transportation (WSDOT) Highways & Local Programs (H&LP) Office has worked with the Association of Washington Cities (AWC) and a committee of city pavement managers

to establish a procedure for accomplishing the reporting requirement. From the beginning, the focus of everyone involved in this effort has been to create a process that not only meets the statutory requirements of the legislation and creates an opportunity to communicate the "city story" but also accomplishes this with the least impact possible to cities and towns.

To meet the 70 percent reporting requirement outlined in the legislation, H&LP has requested arterial condition data from the top thirty cities in population for this biennium. In order to have as complete a city pavement condition picture as possible, H&LP will accept condition data beyond the arterial network, i.e. collectors and local routes. In addition, H&LP will accept data from any city or town that wishes to supply their data this biennium. The only stipulation the legislation placed on the arterial data collection effort is the requirement to use the "Washington state pavement rating method" or Washington methodology. Washington methodology is defined as using the pavement distress definitions and procedures found in the "Pavement Surface Condition Field Rating Manual for Asphalt Pavement," which was developed and amended by the Northwest Pavement Management Association.

H&LP realizes that many implementation issues will present themselves as smaller cities and towns are requested to report condition data in future biennia. Both H&LP and AWC are committed to providing assistance. Many avenues of assistance will be utilized, including no-cost classroom training, on-site consultation and training, and assistance with pavement rating.



For additional information, contact Bob Brooks at (360) 705-7352 or brookbo@wsdot.wa.gov or Jim Seitz, AWC Transportation Specialist, at (360) 753-4137 or jims@awcnet.org.

A Historical Look at Bainbridge Island

By Brian Walsh, P.E., Technical Services Manager,
Washington State Department of Transportation,
Highways & Local Programs

When Captain George Vancouver anchored off Restoration Point on Bainbridge Island in the summer of 1792, he did not realize that Bainbridge Island was an island. English King George II had given him orders to explore every conceivable body of water in order to find the elusive Northwest Passage. Captain Vancouver had sailed from Vancouver Island, Canada into the Strait of Juan de Fuca to see what lay to the east. In a five-day period, Lieutenant Peter Puget, under Captain Vancouver's order, charted most of the inlets of Puget Sound, including the sites of present cities Tacoma and Olympia.

During Captain Vancouver's time anchored on the southern tip of Bainbridge Island between Alki Point and Restoration Point, the Suquamish, led by Chief Kitsap, attempted to trade with these impatient Europeans. The Vancouver expedition was the first European expedition to document and name the volcanoes that we know as Baker, Rainier, St. Helens, and Hood. It would not be until the American expedition of Charles Wilkes in 1841 at Fort Nisqually (northeast of Olympia) that any attempt to establish a settlement or military outpost would occur.

Bainbridge Island is one of those places that brings a certain amount of envy to the rest of us that live around the shores of Puget Sound. Bainbridge Island was not always a city that was in charge of its own future. Until 1991, Winslow, on the southeastern side of the Island, was the only incorporated area; the rest of the island remained a part of King County. When the entire island was incorporated, Island citizens began making the Island distinctly their own. By 1994, they had written a comprehensive plan that allowed economic growth while maintaining the natural environment that many cherish. Blessed with an excellent transportation system, which includes a state highway, a bridge that connects the Island to Kitsap County, and hourly car ferry service from Winslow to downtown Seattle, Bainbridge Island's future is very bright. With a population of approximately 21,000 (2000 Census)

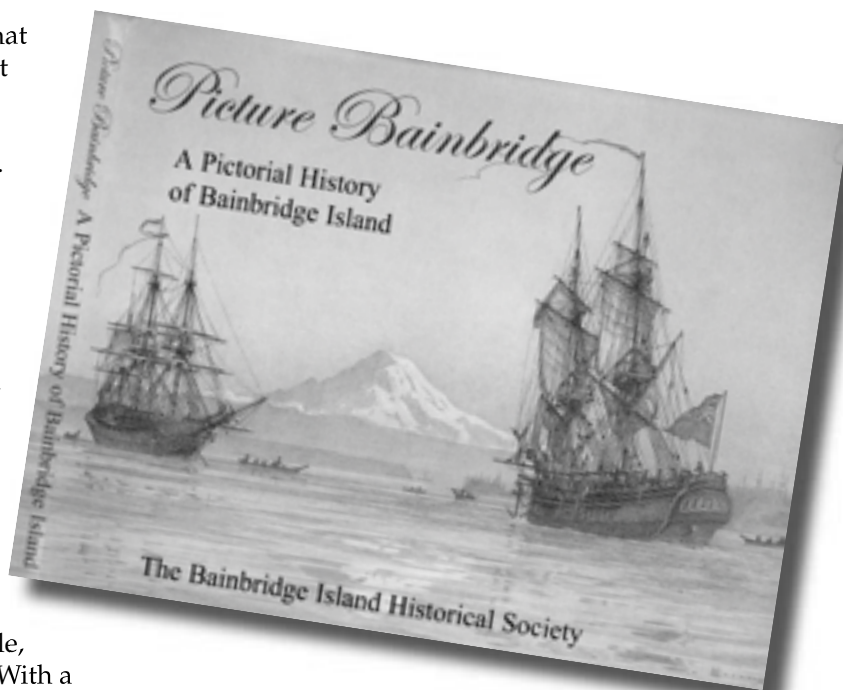
spread over an area of 28 square miles, the island still holds the charm of living in a natural Pacific Northwest setting.

I hope this article will prompt you to conduct your own research on the coastal tribes that inhabited Puget Sound, as well as on the tales of exploration of the Pacific Northwest by British, Dutch, Spanish, Russian, and American explorers.

Information in this article can be found in *Picture Bainbridge: A Pictorial History of Bainbridge Island*. This book can be obtained from the Bainbridge Island Historical Society.

Information about the City of Bainbridge Island can be found at <http://www.ci.bainbridge-isl.wa.us/>.

Special thanks to Randy Witt, Public Works Director for the City of Bainbridge Island, for his encouragement to start our new "Spotlight on Washington Communities" section with Bainbridge Island. Look for your community in future issues of WST2.



Investigation of Flow and Local Scour Characteristics Around a Partially Submerged Permeable WSDOT Barb

Research Study WA-RD 479

By Rocio Peralta, PE. Washington State Department of Transportation (WSDOT) Hydraulics Office

Research Addresses Stream Scour Around Bridge Piers and Abutments

Streambank erosion contributes to the damage of bridge piers and abutments. Barbs reduce erosion along streambanks by deflecting current into the center of the channel aiding in the protection of bridge piers and abutments. Barbs are wide crested trapezoidal structures, typically constructed of riprap gravel, which project out from the streambank and are oriented upstream into the main flow. The overall objective of this study is to establish design criteria for permeable barbs within non-navigable mild sloped gravel bed streams.

Impact of Study

In the present study, the scour characteristics of barbs in mild sloped gravel bed streams were examined utilizing both an immobile and mobile bed configuration. This was accomplished through hydraulic modeling employing the governing parameters of hydraulic similitude. The collection of flow data and scour evolution was achieved in a controlled environment. Moreover, hydraulic modeling using gravel sediment, which is greatly lacking to date,

was successfully modeled in this experiment. And lastly, a new insight to the partnership between scour evolution and velocity distribution was effectively demonstrated.

Scour Prediction Stability of Design

The main goal of this research was to evaluate the scour effects induced by barbs during different flow states, and to provide a tool that enhances the design of stable structures. At maximum flow conditions, the maximum depth of scour produced when compared to the predicted scour depth value for a flow rate that was 67 percent smaller, it was seen that existing equations largely over predict the scour extent, by almost 85 percent in this study. Analysis of the data from the model yielded an analytical expression that quantifies the equilibrium scour depth as a function of the geometric standard deviation of bed material sediment.

Stability of Design

Structure stability is a complex issue. In nature, this depth is conservatively based due to the use of relatively uniform sediment. The other issue of contention is whether a flood event will realize the time required to reach equilibrium scour conditions. This research provides a framework for future investigations.

New Design Performance

This research offers an inexpensive mode for gaining insightful knowledge on the performance of barb structures in the Pacific Northwest. The complexity of flow around the WSDOT barb design and the prevalent distinct flow regimes (main core flow, shear layer region, and stagnant wake region) lend insight to the need for a different mode of shear stress determination. The trend to describe flow in nature using expressions for steady uniform flow conditions needs to be addressed. As shown in this research, 3-D turbulent flow conditions require these variables to be addressed for adequate prediction.

Benefits of Research

A main benefit of this research is the connection to environmental enhancements implications. This can provide more information regarding environmental benefits for use in environmental consultation and permits. Erosion control structures, such as barbs, supply an economic value to society by protecting stream banks and bridges. The potential for environmental and aquatic enhancements can be realized with the creation of slack water and resting pools on the leeward side of the barb. With almost any design in the natural environment, there are pros and cons that need to be weighed. It is the hope that this research

will provide information and stimulate new ideas to enhance environmental and economical hydraulic structures.

Information is Beneficial in Hydraulics Design and Permitting

The main audience for this information is the design and hydraulic engineers at WSDOT. The findings of this research will be incorporated in the WSDOT *Hydraulic Manual* as a reference.

Local agencies may also find this information useful and can contact Brian Hasselbach, WSDOT Highways and Local Programs, at (360) 705-7344 or hasselb@wsdot.wa.gov for more information.

To access a copy of the final research report, contact Sarah Smith, in the WSDOT Research Office, at (360) 705-7971 or smithsa@wsdot.wa.gov.

Rocio Peralta, PE. from the WSDOT Hydraulics Office in Olympia is the technical contact for this project and can be reached at peraltaRC@wsdot.wa.gov.

Dr. Thanos Papanicolaou at the Washington State University, in cooperation with the U.S. Department of Transportation, Federal Highway Administration, conducted this study. James F. Fox and Mrs. Lisa Kjos, both graduate students, assisted Dr. Papanicolaou with the study.



Stream Barbs.



By John W. Carpita, P.E., Public Works Consultant, Municipal Research & Services Center (MRSC)

Many local agencies in Washington State take advantage of RCW 39.04.155, the small works statute, for projects estimated to cost less than \$200,000. Local agencies that can use this statute include counties, cities, towns, community and technical colleges, county roads, fire protection districts, higher education, housing authorities, port districts, public hospital districts, public utility districts, school districts, and water-sewer districts.

The small works roster (SWR) is a process through which there is competition following notification to some or all public works contractors who have requested placement on a roster kept by the local government agency. This differs from competitive bids in which there is competition following advertisement in designated legal newspapers and other media that is open to all public works contractors. Price is the primary basis for consideration and contract award in either instance.

Small Public Works Rosters

Year	State	Statute	Limit	Local Government	Statute	Limit	Comments (Note: Limits checked only for cities and counties.)
1981		None			None		
1982	Yes	39-04-150	\$ 25,000	No	None	N/A	Only General Admin., Fisheries, Game, and Park and Recreation Departments
1983	Yes	39-04-150	\$ 25,000	No	None	N/A	Same 4 agencies
1984	Yes	39-04-150	\$ 25,000	No	None	N/A	Same 4 agencies
1985	Yes	39-04-150	\$ 25,000	No	None	N/A	Same 4 agencies
1986	Yes	39-04-150	\$ 25,000	No	None	N/A	Same 4 agencies
1987	Yes	39-04-150	\$ 50,000	No	None	N/A	Same 4 agencies
1988	Yes	39-04-150	\$ 50,000	No	None	N/A	Same 4 agencies
1989	Yes	39-04-150	\$ 50,000	No	None	N/A	Same 4 agencies
1990	Yes	39-04-150	\$ 50,000	No	None	N/A	Same 4 agencies
1991	Yes	39-04-150	\$ 50,000	Counties	39-04-150	\$ 100,000	Same 4 agencies & Counties
1992	Yes	39-04-150	\$ 50,000	Counties	39-04-150	\$ 100,000	Same 4 agencies & Counties
1993	Yes	39-04-150	\$ 50,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1994	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1995	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1996	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1997	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1998	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Same 4 agencies & authorized municipalities
1999	Yes	39-04-150	\$ 100,000	As Authorized	39-04-150	\$ 100,000	Authorized agencies & municipalities
2000	As Authorized	39-04-150	\$ 200,000	As Authorized	39-04-150	\$ 200,000	Authorized agencies & municipalities
2001	As Authorized	39-04-150	\$ 200,000	As Authorized	39-04-150	\$ 200,000	Authorized agencies & municipalities. Also adds limited public works projects
2002	As Authorized	39-04-150	\$ 200,000	As Authorized	39-04-150	\$ 200,000	Authorized agencies & municipalities. Also adds limited public works projects
2003	As Authorized	39-04-150	\$ 200,000	As Authorized	39-04-150	\$ 200,000	Authorized agencies & municipalities. Also adds limited public works projects

History

As can be seen in the above Summary of Small Works Roster Statutes, the original 1982 statute only applied to four specific state agencies for projects less than \$25,000. Counties were added in 1991. In 1993, the statute was amended to include any local government to which specific authorization has been given, with an upper limit set at \$100,000. In 2003, the limit was raised to a uniform \$200,000 for authorized agencies and a limited public works project process was added.

Procedures

A SWR lists contractors who have requested placement on the roster and who are properly licensed or registered to perform work in Washington. RCW 39.04.155 outlines procedures to be followed:

- The municipality must first pass a resolution or ordinance authorizing use of the SWR process and establishing procedures for the award of public works contracts using the SWR process for contracts up to \$200,000 and limited public work process up to \$35,000. A "Model Small Works Roster Resolution" can be found at <http://www.mrsc.org/Subjects/PubWorks/ModelResolutionA.aspx>.

- The municipality need not comply with formal sealed bidding procedures for the construction, building, renovation, remodeling, alteration, repair, or improvement of real property where the estimated cost does not exceed \$200,000, which includes the costs of labor, material, equipment, sales and/or tax, as applicable. Instead, the agency may use the SWR and limited public works (less than \$35,000) procedures for public works projects. However, breaking any project into units or accomplishing any project by phases is prohibited, if it is done for the purpose of avoiding the maximum dollar amount of a contract that may be let using the SWR process.
 - An agency may create a single general SWR or may create a SWR for different specialties or categories of anticipated work. SWRs may make distinctions between contractors based upon different geographic areas served by the contractor.
 - SWRs shall consist of all responsible contractors who have requested to be on the rosters, and—where required by law—are properly licensed or registered to perform such work in this state. Contractors desiring to be placed on rosters must keep current records of any applicable licenses, certifications, registrations, bonding, insurance, or other appropriate matters on file with the agency as a condition of being placed on the rosters.
 - At least once a year, the municipality shall publish, in a newspaper of general circulation within the jurisdiction, a notice of the existence of the rosters and solicit the names of contractors for such rosters. Responsible contractors shall be added to an appropriate roster at any time that they submit a written request and necessary records. The agency may require master contracts to be signed that become effective when a specific award is made using a SWR.
 - Several agencies may agree to use the SWR. However, an interlocal contract or agreement among local governments establishing a SWR must clearly identify the lead entity that is responsible for implementing the roster provisions. The City of Lynnwood is the lead agency for a number of agencies in south Snohomish and north King Counties. See the web site at <http://ci.lynnwood.wa.us/Content/Business.aspx?id=288>.
 - A municipality must obtain telephone, written, or electronic quotations for public works contracts from contractors on the appropriate SWR to assure that a competitive price is established and to award contracts to the lowest responsible bidder, as defined in RCW 43.19.1911(9), as quoted below:
 - (9) In determining “lowest responsible bidder”, in addition to price, the following elements shall be given consideration:
 - (a) The ability, capacity, and skill of the bidder to perform the contract or provide the service required;
 - (b) The character, integrity, reputation, judgment, experience, and efficiency of the bidder;
 - (c) Whether the bidder can perform the contract within the time specified;
 - (d) The quality of performance of previous contracts or services;
 - (e) The previous and existing compliance by the bidder with laws relating to the contract or services;
 - (f) Such other information as may be secured having a bearing on the decision to award the contract:
- PROVIDED, That in considering bids for purchase, manufacture, or lease, and in determining the “lowest responsible bidder,” whenever there is reason to believe that applying the “life cycle costing” technique to bid evaluation would result in lowest total cost to the state, first consideration shall be given by state purchasing activities to the bid with the lowest life cycle cost which complies with specifications. “Life cycle cost” means the total cost of an item to the state over its estimated useful life, including costs of selection, acquisition, operation, maintenance, and where

applicable, disposal, as far as these costs can reasonably be determined, minus the salvage value at the end of its estimated useful life. The "estimated useful life" of an item means the estimated time from the date of acquisition to the date of replacement or disposal, determined in any reasonable manner. Nothing in this section shall prohibit any state agency, department, board, commission, committee, or other state-level entity from allowing for preferential purchase of products made from recycled materials or products that may be recycled or reused.

- A contract awarded from a SWR need not be advertised. Invitations for quotations shall include an estimate of the scope and nature of the work to be performed as well as materials and equipment to be furnished. However, detailed plans and specifications need not be included in the invitation. This paragraph does not eliminate other requirements for architectural or engineering approvals as to quality and compliance with building codes.

- Quotations may be invited from all appropriate contractors on the appropriate SWR. As an alternative, quotations may be invited from at least five contractors on the appropriate SWR who have indicated the capability of performing the kind of work being contracted, in a manner that will equitably distribute the opportunity among the contractors on the appropriate roster.

- "Equitably distribute" means that the agency may not favor certain contractors on the appropriate SWR over other contractors on the SWR who perform similar services. In the interest of fairness, agency representatives should not inform any contractor of the terms or amount of any other contractor's bid for the same project until after all quotes have been received and opened.

- If the estimated cost of the work is from \$100,000 to \$200,000, a municipality (except for port districts) that chooses to solicit bids from less than all the appropriate contractors on the appropriate SWR must also notify the remaining contractors on the roster that quotations on the work are being sought. The agency has the sole option of determining whether this notice to the remaining contractors is made by:

- (i) Publishing notice in a legal newspaper in general circulation in the area where the work is to be done.

- (ii) Mailing a notice to these contractors.

- (iii) Sending a notice to these contractors by facsimile or other electronic means.

- A written record shall be made by agency representatives of each contractor's bid on the project and of any conditions imposed on the bid. Immediately after an award is made, the bid quotations obtained shall be recorded, open to public inspection, and available by telephone inquiry.

- RCW 39.04155(3) allows authorized local governments to use a 'limited public works projects' process for contracts with an estimated cost of less than \$35,000. A local government may waive the payment and performance bond requirements of chapter 39.08 RCW and the retainage requirements of chapter 60.28 RCW. They assume liability for the contractor's nonpayment of laborers, mechanics, subcontractors, material men, suppliers, and taxes imposed under Title 82 RCW that may be due from the contractor. However the local government has the right of recovery against the contractor for any payments made on the contractor's behalf. To use this limited public works process, an authorized local government must solicit electronic or written quotations from a minimum of three contractors from the appropriate SWR and award the contract to the lowest responsible bidder as defined under RCW 43.19.1911. After an award is made, the quotations are to be open to public inspection and available by electronic request. The agency is to attempt to distribute opportunities for limited public works projects equitably among contractors willing to perform in the geographic area of the work. Under the limited public works process, the local government must maintain a list of the contractors contacted and the contracts awarded during the previous twenty-four months including the name of the contractor, the contractor's registration number, the amount of the contract, a brief description of the type of work performed, and the date the contract was awarded.

- All of the telephone bids or quotations should be collected and presented at the same time to the municipality for consideration, determination of the lowest responsible bidder, and award of the contract. The governing body may delegate authority to award bids of certain amount(s) to an officer of the agency. Most often, there is a requirement that the municipality shall ratify the officer's approval at the next scheduled governing body meeting.
- The statutory requirement of 13 days advertising for a public works project in formal bid processes does not apply to a SWR or limited public works process - advertising is not required. However, depending on the complexity of the project, we suggest that 7 to 14 days (or longer) should be allowed for contractors to submit a proposal so that they have adequate time to properly research the specifications.

Miscellaneous Comments

- If a city or county contacts five firms on its SWR but receives less than five quotes, it is acceptable to award to the lowest of those quotes received.
- Bid bonds should be required, as the low bidder may refuse the work after the bids of the other contractors are known or fail to put reasonable effort into the bid preparation. Performance and payment bonds are required in any event.
- A SWR does not eliminate the need for contract documents, performance bond, contract, specifications, etc.
- As noted above, it is wise to allow contractors sufficient time to prepare their bids. A SWR generally favors local firms since outside firms may not be aware that projects are being awarded through the SWR process.

- Estimated project costs must:
 - Be based on a competitive bid basis, not simply on agency costs.
 - Include all construction related work, but not engineering/architectural design fees.
 - Include all phases of the project.
 - Include applicable sales and use taxes
 - Not include donated labor, materials, supplies, etc.
- If the estimated project cost exceeds \$200,000, the project must be advertised and competitively bid.



Rockin' Roman Moments

Question #1

Claudius Eusebus, your county road superintendent, wants to purchase a \$70,000 Roto-Rooter chariot. Can the county use the small works roster?

No. The small works roster is only for public works projects. There is a vendor purchase procedure that can be used for purchases between \$2,500 and \$25,000, but the chariot purchase is well beyond those limits. So in this situation, a full competitive bid procedure must be utilized.

Question #2

Your cost estimate for the Appian Way Road project, which has been checked by two other engineers and includes sales tax, is \$195,000. Using your small works roster, you solicit quotes, all four of which are over \$200,000 and average \$209,000. Do you need to reject all the quotes and advertise the project as a competitively bid project? What if the average was \$250,000?

No. RCW 39.04.155 refers to the 'estimated cost' in relation to use of the small works roster. Your estimate is definitely a good faith estimate, as you had two other engineers check it. However, if all the quotes are substantially higher, your engineers should check their assumptions carefully, and you should definitely consider rejecting the quotes and go out for bids.

Question #3

Is a bid bond required for a small works roster project in Cle Elmsium, Washington, a city with a population less than 20,000?

A bid bond is not required when using the small works roster procedure. This conclusion is based on the language of RCW 35.23.352(3), which states "In lieu of the procedures of subsection (1) of this section, a second class city or a town (or a code city with less than 20,000 population) may let contracts using the small works roster process provided in RCW 39.04.155." The requirement of a bid bond is contained in RCW 35.23.352(1), which does not, based on the above language, apply when using the small works roster.

Question #4

Does the language in RCW 39.04.155(4), regarding the small works roster procedures that "detailed plans and specifications need not be included in the invitation", mean that the Island County Roman Theater District does not need to prepare detailed plans and specifications?

No. A county is required by RCW 39.04.020 to prepare plans and specifications for all public works projects. The language in RCW 39.04.155(4) does not amend that requirement. It merely states that the local government agency does not need to send out plans and specifications along with the invitation for small works roster participants to bid on the project. The level of detail in the plans and specifications, which will still need to be prepared but need not be sent out, will depend, of course, on the type of project.



News from FHWA Washington Division

By Liana Liu, P.E., Traffic/Safety/
Research/T2 Engineer, FHWA
Washington Division

Inside the USDOT's "Intelligent Intersection" Test Facility

On June 24, 2003, U.S. Transportation Secretary Norman Y. Mineta officially announced the opening of a new "Intelligent Intersection" test facility at the Federal Highway Administration's (FHWA) Highway Research Center in McLean, VA. The facility will be used to test technologies designed to save lives by preventing crashes at intersections. In conjunction with the recent National Meeting of the Intelligent Vehicle Initiative (IVI), the three state participants in the IVI Infrastructure Consortium demonstrated three different Intersection Decision Support (IDS) systems designed to significantly reduce intersection crashes. More information can be found at the following web address: http://www.nawgits.com/icdn/intell_intersection.html.

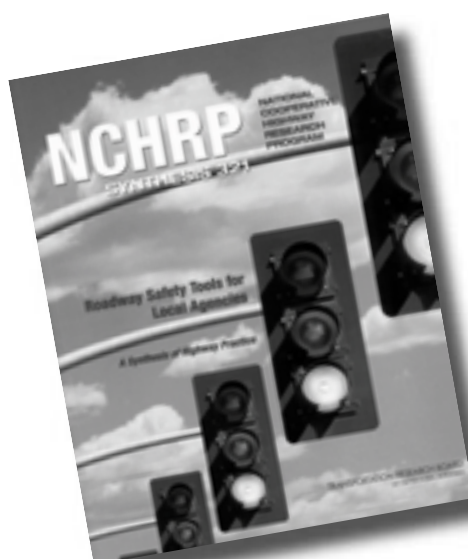
Updated Minimum Retroreflectivity Levels for Traffic Signs

FHWA published a study that updated the minimum levels of traffic sign retroreflectivity for regulatory, guide, and warning signs.

The associated changes in driver eye height and headlight positions, the new legibility requirements of the MUTCD, the needs of older drivers, and the performance features of new sign materials are included in the study. The online report can be accessed at <http://www.tfhr.gov/safety/pubs/03081/03081.pdf>.

Roadway Safety Tools for Local Agencies

TRB's National Cooperative Highway Research Program (NCHRP) Synthesis 321: Roadway Safety Tools for Local Agencies



examines the safety tools and procedures that are practical and relatively easy to apply, and that can be implemented by agencies with limited financial support and personnel. Recognizing the wide variation in the operations and responsibilities of local agencies, the report acknowledges that the level of expertise in transportation safety analysis also varies greatly. The online report can be found at http://trb.org/publications/nchrp/nchrp_syn_321.pdf. It can also be found in the WST2 Resources section of this newsletter.

Intersection Design and Safety Toolbox (Draft Chapters)

The Institute of Transportation Engineers (ITE) 2004 Technical Conference and Exhibit, *Intersection Safety: Achieving Solutions Through Partnerships*, is a cooperative effort by ITE and the Federal Highway Administration to address the timely topic of intersection safety.

To explore areas related to planning and design, operations, and safe communities, the technical program was supplemented with six sessions that correspond to six chapters in the *Intersection Design and Safety Toolbox*. The six **draft** chapters can be viewed at <http://www.ite.org/safety/toolbox.asp>.



Recent Books on the Interstate Highway System

By Jennifer Boteler, Washington State Department of Transportation (WSDOT) Librarian

Abstracts paraphrased from publisher materials.

Houston Freeways: a Historical and Visual Journey by Erik Slotboom. Printed by C. J. Krehbiel, Cincinnati, Ohio, 2003.

In his book, Slotboom strives to answer questions he's pondered since childhood. What was here before the freeway? Who decided the freeway would be built here? Why was the freeway built with its design. The influence of the freeway on the development of modern Houston is a central theme of *Houston Freeways*. You'll also find fascinating stories, remarkable people, amazing scenery, and time capsules to the past.

The Roads that Built America: the Incredible Story of the U.S. Interstate System by Dan McNichol. Barnes & Noble, 2003.

The Roads that Built America tells the amazing story of the intricate Interstate System. From its origins in a primitive road conceived by George Washington, to the 42,795 miles that bind the country together today. The Interstate is the backbone of our military transportation and our economy,

Twentieth-century sprawl : highways and the reshaping of the American landscape by Owen D. Gutfreund. Oxford University Press, 2004. As federal, state, and local governments invested in toll-free highways, Americans moved in unprecedented numbers to newly accessible open land on the urban periphery. Gutfreund offers an illuminating look at how highways have dramatically transformed American communities, aiding growth and development in unsettled areas and undermining existing urban centers.

You Can Get There From Here: How the Interstate Highways Transformed America by Martin D. Hanlon. Palgrave Macmillan, 2002. Proposed in 1944 and begun in 1956, the U.S. interstate highway system reaches 42 state capitals. This title looks at the creation of this system during the peak of cold war hysteria and brings its story up to the 21st century to show the way in which this vast system changed the way Americans live.

The preceding titles are new publications that have recently been added to the WSDOT Library collection. The following books are a selective listing of other materials that are available on the history and construction of the Interstate Highway System.

America On The Move. U.S. Dept. of Transportation, Federal Highway Administration, 1993.

The Best Investment A Nation Ever Made : A Tribute To The Dwight D. Eisenhower System of Interstate and Defense Highways by Wendell Cox & Jean Love. American Highway Users Alliance, 1996.

Commemoration Guide : Celebrating America's highways, 1956-1996 : Interstate Highway System 40th anniversary. Interstate Highway Commemorative Fund, 1996.

Divided Highways: Building the Interstate Highways, Transforming American Life by Tom Lewis. Penguin Books, 1999.

The Interstate Highway System (Resource publications in geography series) by Henry Moon. Association of American Geographers, 1994.

The States and the Interstates : Research on the Planning, Design and Construction of the Interstate and Defense Highway System by Public Works Historical Society. American Association of State Highway and Transportation Officials, 1991.



For more information on any of these titles or for help in obtaining copies, please contact the WSDOT Library at library@wsdot.wa.gov or (360) 705-7751.



By Roger Chappell, Technology Integration Engineer, Washington State Department of Transportation Highways & Local Programs WST2 Center

It has only been in the past few years that the general public has had the opportunity to view what has been happening in the wild world of supercomputing. To many it is still no more than an interesting topic for conversation, and it is then quickly dismissed to the realm of science fiction. Those who have been watching the developments in this arena may agree that corporate level supercomputing is on the very near horizon if not already a reality. Over the last twenty years, supercomputing has undergone the same rapid development that the PC has enjoyed, but with far less fanfare. Today, for about the price of a new car, you can have your very own "mini cluster" supercomputer. The days of large rooms full of expensive custom computer equipment are changing. A cluster can be scaled down to about the size of a file cabinet or scaled up to thousands of nodes, and can be built with off-the-shelf components.

So what is so super about supercomputers? Is it the speed at which they process data, the storage capacity, or the type of

What is So Super About a Supercomputer?

problems they are able to solve that earns them the title of "super" computer? Whatever has earned them that title, I'm sure they are able to meet the challenge.

Before we tackle the questions about who, what, and where of super computing, we need to answer the question of why public works and transportation professionals should care about supercomputers. The answer is Asset Management. In my last article, I covered the topics of trend analysis and predictive modeling. Asset Management holistically looks for the most effective means to manage the assets we have been entrusted by the public to manage. There are many systematic approaches available today but most have lead to what is termed "stove pipe" systems. These systems may serve their particular discipline well, but they haven't always integrated easily with other data representing the rest of the infrastructure. Data marts have been formed to create a one stop shopping experience for infrastructure managers, but there is still much work to be done. I am looking forward to the next generation of tools that will allow me to create 3-D models of the infrastructure, tweak the variables in the model, and simulate the results over time. I will need the ability to bring in large datasets of a variety of data types such as Lidar, Geographical Information Systems (GIS), Global Positioning System (GPS), Space based imaging, Ground Based Imaging (GBI), and Aerial Photography. Many of the tools to work with this type

Today, for about the price of a new car, you could have your very own "mini cluster" supercomputer. The days of large rooms full of expensive custom computer equipment are changing.

of data have already been created and used in the supercomputing community.

Most current data is designed to represent a "snapshot in time." If you look through these snap shots, you will be able to watch how an asset performs over time, much like a time-lapse video. It can take enormous amounts of computer processing power to create this time-lapse effect. Along with seeing how an asset performs over time, I also want to see how well it performs within a predictive world model. This is difficult to do on an asset-by-asset basis; it is even more difficult to do with thousands of records. Smart models that can age over time and simulate future events are very data intensive. Regressive and predictive modeling on a large scale has been accomplished with the use of supercomputers. The nice thing

about these systems is that they can be easily scaled up or down to handle just about any requirement.

The next generations of high-end computer software are most likely running on a supercomputing platform right now. Many people today are using backend supercomputers without the end user even being aware of it. For example, if you have ever used Google to perform a search on the web, you have interacted with a backend supercomputer. As you navigate the front end using an Internet browser, the backend is a 50,000 + node Linux cluster fulfilling your search request. Google's backend supercomputer currently processes over 150 million queries a day with an average response time of less than a quarter of a second for each query. All Google data centers' software and hardware are running 24/7, with no downtime, on their own custom version of Linux. Google has proved it can be done at the high end. I believe that in the near future, a system could be scaled back to meet the needs of most asset managers. For an excellent overview of Google's clustering technology, you can view a web video of a class taught at the University of Washington by Urs Hölzle of Google Inc. at <http://www.uwv.org/programs/displayevent.asp?rid=1680>.

How hard is it to use a supercomputer? For some, it can be as easy as surfing the web.

This is just one of many examples of how supercomputing clusters are being used by corporate America today. There are video games played over the Internet with backend supercomputers, and many of the graphic effects used in Hollywood movies are rendered using supercomputers. Many of the data intensive research projects are processed using supercomputers. As interfaces are created to simplify the process of interacting

with supercomputers, I believe they will continue to become a more mainstream solution for the ever-increasing demands of corporate computing.

One of my favorite stories is that of the Stone Souper Computer from Oak Ridge National Laboratory (ORNL) in Tennessee. In the late 1990s, it was billed as the cheapest supercomputer ever built. It was named for the children's story where everyone contributed a small portion to the communal soup pot to feed the village. In 1997, the Stone Souper Computer was built with contribution "cast offs" from various IT departments. Hundreds of surplus computers were clustered together to form what was then the cheapest supercomputer ever built. The makers of the Stone Souper Computer proved what could be done with limited resources and a little ingenuity. The project started because they needed to produce a map of the eco-regions in the U.S. The Stone Souper Computer was really just a by-product of a really large GIS project. They were pioneers in this arena and a lot has changed since those early days only a few years ago. Software has become more efficient and easier to use, and the hardware has become more powerful. They say time in the digital world is measured in nano-seconds; sometimes it feels like it is passing much faster. More information about the Stone Souper Computer can be found at <http://stonesoup.esd.ornl.gov/>.

To date, the supercomputer sector has seen as much change as the home PC market, but with much less fanfare. Ten years ago, it would have cost over a million dollars to buy a supercomputer. Today it is possible for a research department to build its own cluster for less than \$50,000. We may still be a long way from supercomputers for the masses, but it was less than twenty years

ago that my first computer at the Washington State Department of Transportation was an Apple IIe with dual floppies and no hard drive. What will take place by the year 2020 is still a subject of much speculation.

Though the days of the Stone Souper Computer are past, ORNL is now looking to build a computer that will surpass the Earth Simulator built by NEC, currently the world leader. For more information about this project go to <http://www.supercomputingonline.com/article.php?sid=6177>. While you are out surfing around, you may want to take a quick tour of the TOP 500 website (<http://www.top500.org/>) to see what is happening at the high-end spectrum of supercomputing technology. At this website, I found that supercomputer performance will continue to grow at a steady rate through 2010. By then, the projected performance will exceed 100 Peta Flops. Currently, clusters and constellations are the dominant leaders in the architectures and performance categories. They are also overall leaders with 67 percent of the TOP 500 systems. Surprisingly, it is not the major computer manufacturers that are building these systems. Many of these systems are running a variant of Linux and using off-the-shelf server hardware.

I would like to leave you with highlights from the top ten from the TOP 500 website (see the list on the following page). The information may be a bit dated by the time this article goes to press, but it is current for early 2004.

If nothing else, I hope this article has piqued your interest in the possibilities of using this type of technology in the future and to the potential that it holds for application development.



Highlights from the Top 10

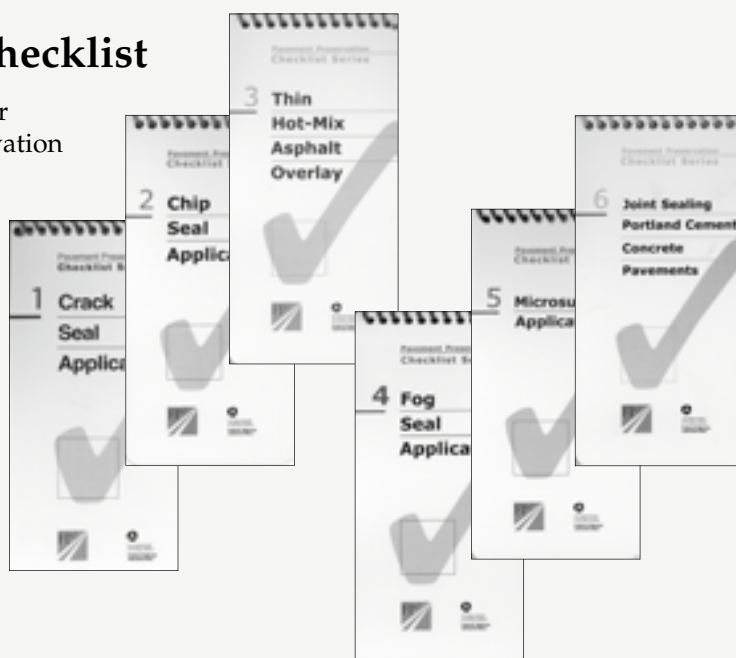
- The Earth Simulator, built by NEC, remains the unchallenged #1.
- ASCI Q at Los Alamos is still #2 at 13.88 TFlop/s.
- The third system ever to exceed the 10 TFlop/s mark is Virginia Tech's X measured at 10.28 TFlop/s. This cluster is built with the Apple G5 as building blocks and is often referred to as the 'SuperMac' in media reports. It uses a Mellanox network based on the new Infiniband technology as interconnect.
- The fourth system is also a cluster. The Tungsten cluster at NCSA is a Dell PowerEdge-based system using a Myrinet interconnect. It just missed the 10 TFlop/s mark with a measured 9.82 TFlop/s.
- The list of clusters in the TOP 10 continues with the upgraded Itanium2-based Hewlett-Packard system, located at DOE's Pacific Northwest National Laboratory, which uses a Quadrics interconnect.
- Number six is the first system in the TOP500 based on AMD's Opteron chip. It was installed by Linux Networkx at the Los Alamos National Laboratory and also uses a Myrinet interconnect.
- The list of cluster systems in the TOP 10 has grown impressively to seven systems.
- The Earth Simulator and the two IBM SP systems at Lawrence Livermore and Lawrence Berkeley national labs are the other three systems.
- With the exception of the leading Earth Simulator, all other TOP 10 systems are installed in the U.S.
- The performance of the number 10 system jumped to 6.6 TFlop/s.

Pavement Preservation Checklist

The Washington State Technology Transfer Center has a supply of "Pavement Preservation Checklist Series" guides published by the Federal Highway Administration. There are six guides in the series:

- Crack Seal Application
- Chip Seal Application
- Thin Hot-Mix Asphalt Overlay
- Fog Seal Application
- Microsurfacing Application
- Joint Sealing Portland Cement Concrete Pavements

The pocket-sized, spiral-bound booklets are free and can be ordered by e-mail at wst2center@wsdot.wa.gov or by phone at (360) 705-7386.



WST2 Resources

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<http://www.wsdot.wa.gov/TA/T2Center/T2PUBS.htm>

Or you may fax the form to (360) 705-6858; or mail the form to WST2/WSDOT, H&LP, P.O. Box 47390, Olympia, WA 98504-7390; or e-mail your request to WST2Center@wsdot.wa.gov; or phone (360) 705-7386.

☒ Check the items you would like to order.

Hard Copy Publications

- ☐ Accessible Sidewalks and Street Crossings, FHWA, 2003
- ☐ Asset Management Primer, FHWA, 1999
- ☐ Concrete PASER Manual, University of Wisconsin, 1998
- ☐ Data Integration Primer, FHWA, 2001
- ☐ Designing Sidewalks and Trails for Access, Part 2, FHWA, 2001
- ☐ Dust Control on Low Volume Roads, FHWA, 2001
- ☐ Family Emergency Preparedness Plan, American Red Cross, et al., 1999
- ☐ Field Guide for Unpaved Rural Roads, Wyoming T2 Center, 1997
- ☐ Fish Passage Through Culverts, FHWA, USDA, 1998
- ☐ General Field Reference Guide (Pocket Size), 2002
- ☐ Geotextile Selection and Installation Manual for Rural Unpaved Roads, FHWA, 1989
- ☐ A Guide for Erecting Mailboxes on Highways, AASHTO, 1984
- ☐ HMA Pavement Smoothness, FHWA, 2002
- ☐ Improving Conditions for Bicycling and Walking, FHWA, 1998
- ☐ Improving Highway Safety at Bridges on Local Roads and Streets, FHWA, 1998
- ☐ Maintenance of Aggregate and Earth Roads, WST2 Center (1994 reprint)
- ☐ Pavement Preservation Checklist, FHWA, six pocket guides
- ☐ Recommendations to Reduce Pedestrian Collisions, WSDOT, December 1999
- ☐ Redevelopment for Livable Communities, Rhys Roth, Energy Outreach Center, 1995
- ☐ Reflective Sheeting Identification Guide, FHWA, 2001
- ☐ Scenic Byways Map of Washington State, 2003
- ☐ School Administrator's Guide to School Walk Routes and Student Pedestrian Safety, Washington Traffic Safety Commission and WSDOT, 2003
- ☐ State-of-the-Art Survey of Flexible Pavement Crack Sealing Procedures in the United States, CRREL, 1992
- ☐ Traffic Control Handbook for Mobile Operations at Night, FHWA, 2003
- ☐ Trail Construction & Maintenance Notebook, USDA Forest Service, 2000
- ☐ Utility Cuts in Paved Roads, Field Guide, FHWA, 1997
- ☐ W-Beam Guardrail Repair and Maintenance, FHWA, 1996
- ☐ A Walkable Community is More Than Just Sidewalks, FHWA, 2000

- ☐ Washington Bicycle Map, WSDOT, 2001
- ☐ Wetland Trail Design and Construction, USDA, 2001
- ☐ Wildlife Habitat Connectivity Across European Highways, FHWA, 2002

Workbooks and Handouts from WST2 Center Workshops

- ☐ Application of Geographic Information Systems for Transportation, FHWA, 1999
- ☐ Construction Documentation: Construction Training Manual for Local Agencies, WSDOT, 2003
- ☐ Environmental Overview, *LAG Manual* Chapter 24, WSDOT, 2004
- ☐ Restoration of Aquatic Species Passage Using Stream Simulation, 2003

Videotapes

- ☐ Driving Modern Roundabouts, City of Lacey, City of Olympia, and WSDOT, 2002
- ☐ Pacific Northwest Transportation Technology Expo and Mousetraps

CD ROM

- ☐ H&LP CD Library (formerly WST2 CD Library), 6th Edition, Summer 2004 contains the following publications and many other technical documents:
 - Asphalt Pavement Repair Manuals of Practice, SHRP, 1993
 - Asphalt Seal Coats, WSDOT/WST2 Revised 2003
 - Building Projects that Build Communities, Community Partnership Forum, 2003
 - Concrete Pavement Repair Manuals of Practice, SHRP, 1993
 - Dust Palliative Selection and Application Guide, USFS, 1992
 - Gravel Roads Maintenance and Design Manual, South Dakota LTAP, November 2000
 - A Guide for Local Agency Pavement Managers, NWT2 Center, 1994
 - Local Agency Pavement Management Application Guide, WST2 Center, 1997
 - Local Agency Safety Management System, WSDOT, 1998, Reprinted 2000

- Maintenance of Signs & Sign Supports for Local Roads and Streets, FHWA, 2001
- Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel, FHWA, 1996
- Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA, WSDOT, 1999
- Roundabouts: An Information Guide, FHWA, 2000
- Streetwise, A Simplified Local Agency Pavement Management System, WSDOT, 2000

Some of the publications on the CD Library are still available in hard copy within Washington State only.

Other CDs

- Bicycle Safer Journey, FHWA, 2003
- Biological Assessment Preparation CD: Standard References, WSDOT, 2002
- Community Impact Assessment Subcommittee Workshop Proceedings, 2001
- Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- Emergency Relief Training for Washington State Local Agencies, WSDOT, 2004
- Gravel Roads: Maintenance and Design Manual, FHWA, SD LTAP, 2000
- Pedestrian/Bicycle Crash Analysis Tool, FHWA, 1999
- Pedestrian Facilities Guidebook, WSDOT, 1997
- Safer Journey, FHWA, 2003
- Tools for Identifying Land Use Areas with Potential for Pedestrian Travel and Prioritizing Investments, UW/WSDOT, 2001
- WSDOT Engineering Publications CD Library, March 2004

DVD

- Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- Pacific Northwest Transportation Technology Expo and Mousetraps

Non-Credit Self-Study Guides

These non-credit WSDOT self-study guides may be obtained from the WST2 Center. An invoice will be sent with the books.

Basic Surveying, \$20

Advanced Surveying (metric), \$20

Contract Plans Reading, \$25

Technical Mathematics I, \$20

Technical Mathematics II, \$20

Basic Metric System, \$20



Online Resources

Bridge

- WSDOT Highways & Local Programs
<http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM>

Environmental

- *Environmental Procedures Manual* (M31-11)
<http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/EPM/EPM.htm>
- Regional Road Maintenance Endangered Species Act Program Guidelines
<http://www.metrokc.gov/roadcon/bmp/pdfguide.htm>
- National Marine Fisheries Service Species Listings & Info
<http://www.nwr.noaa.gov/>
- U.S. Fish and Wildlife Service Species Listings & Info
<http://endangered.fws.gov/>
- Washington State DNR's Natural Heritage Program Home Page
<http://www.wa.gov/dnr/htdocs/fr/nhp/refdesk/fsrefix.htm>
- FHWA's Environmental Home Page
<http://www.fhwa.dot.gov/environment/index.htm>

Highways & Local Programs List Serves

- Local Agency Guidelines (LAG) Manual
<http://lists.wsdot.wa.gov/guest/RemoteListSummary/LAGG>
- Traffic and Safety Management
http://www.t2sms-l@lists.wsdot.wa.gov/guest/RemoteListSummary/T2SMS_L
- Pavement Management
http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2PAVE_L
- WST2 Newsletter
http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2News_L
- WST2 Training
http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2TRNG_L

WSDOT Materials Lab

- <http://wsdot.wa.gov/biz/mats/htm>

Infrastructure Management & GIS/GPS

The site below has been established to promote interagency data exchange and resources sharing between local governmental agencies.

<http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/InfrastructureTechnology/InfThp.html>

Legal Search

- Search RCWs and WACs
<http://search.leg.wa.gov/pub/textsearch/default.asp>

Local Agency Guidelines (LAG) Manual

- <http://www.wsdot.wa.gov/TA/Operations/LAG/LAGHP.htm>

Pavement Management

- Pavement Publications & NWPMA Links
<http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology>
- NWPMA - North West Pavement Management Association
<http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology/nwpma.html>
- Asphalt Institute
<http://www.asphaltinstitute.org/>
- National Asphalt Pavement Association
<http://www.hotmix.org/>
- Pavement (A Web Site for Managing Pavements)
<http://www.mincad.com.au/pavenet>
- SuperPave Information
<http://www.utexas.edu/research/superpave>

Project Development

- Federal Aid Progress Billing Form
<http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORM.XLS>
- State Funded Progress Billing Form
<http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORMSTATE.xls>
- STIP (State Transportation Improvement Program)
<http://www.wsdot.wa.gov/TA/ProgMgt/STIP/STIPHP.htm>

- TIP (Local Agency 6-Year Transportation Improvement Program)
<http://www.wsdot.wa.gov/TA/ProgMgt/STIP/TIP.html>

Research

- WSDOT Research Office
<http://www.wsdot.wa.gov/ppsc/research>
- Looking for a Transportation Research Publication?
<http://www.nas.edu/trb/index.html>
- Municipal Research and Services Center of Washington
<http://www.mrsc.org>

Traffic & Safety

- Safety Management Publications & Information
<http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/SafetyTechnology/>
- WSDOT Traffic Data Office
<http://www.wsdot.wa.gov/mapsdata/tdo/>
- Washington State Patrol
<http://www.wa.gov/wsp/wsphome.htm>
- Washington Traffic Safety Commission
<http://www.wa.gov/wtsc>
- National Highway Traffic Safety Administration
<http://www.nhtsa.dot.gov>
- American Traffic Safety Services Association
<http://www.atssa.com>
- Municipal Research and Services Center of Washington
<http://www.mrsc.org>
- Transportation Research Board
<http://www.nas.edu/trb/index.html>

Training

- WST2 Classes & LAG Training
<http://www.wsdot.wa.gov/TA/T2Center/Training/>
- WST2 Class Registration
<http://www.wsdot.wa.gov/TA/T2Center/t2hp.html>
- County Road Administration Board
<http://www.crab.wa.gov/>
- American Public Works Association
<http://www.apwa.net/education>
- Transportation Partnership in Engineering Education Development (TRANSPED)
<http://www.engr.washington.edu/epp>

WSDOT Local Programs Engineers

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Keith Martin (509) 324-6080,
martink@wsdot.wa.gov
- Northwest Region (Seattle)
Ed Conyers (206) 440-4734,
paanant@wsdot.wa.gov
- Olympic Region (Olympia)
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Paul Maher (509) 667-3090 or 667-2900,
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- South Central Region (Yakima)
Roger Arms (509) 577-1780,
armsr@wsdot.wa.gov
- Southwest Region (Vancouver)
Bill Pierce (360) 905-2215,
pierceb@wsdot.wa.gov

Other Online Resources

- Bicycle maps and other information
<http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html>
- Pedestrian information
<http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html>
- Rural Partnerships and scenic byways information
<http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html>
- Better Mousetraps
<http://www.wsdot.wa.gov/ta/T2Center/Mousetraps/>
- Retired Professional Program
<http://www.wsdot.wa.gov/TA/T2Center/Retired.htm>
- Student Referral Program
<http://www.wsdot.wa.gov/TA/T2Center/StudentReferral/>
- LTAP (Local Technical Assistance Program) Clearing House
<http://www.ltapt2.org>
- Institute of Transportation Engineers
<http://www.ite.org>
- Washington State Counties
<http://access.wa.gov/government/awco.asp>
- Washington State Cities and Towns
<http://access.wa.gov/government/awcity.asp>
- Governor's Office of Indian Affairs
<http://www.wa.gov/goia/index.html>
- Southwest Interagency Coop - Grounds Equipment Maintenance (GEM)
<http://www.gematwork.org>

Training Opportunities



Laurel Gray, WST2
Training Program
Coordinator

Washington State T2 Center

Contact: Laurel Gray (360) 705-7355
Wendy Schmidt (360) 705-7386
<http://www.wsdot.wa.gov/TA/T2Center/Training>

To register for a class in this section, use the contact listed above.

The class fees shown apply to both public and private sector students. Classes marked with an asterisk (*) qualify under the Road and Street Management Training Program as a requirement or an elective and contribute to a Certificate of Achievement (CA) in Road and Street Management. On-line registrations are now being accepted for the following classes. Further information on these courses can be obtained from the web page listed above.

Pavement Condition Rating*

September 7-8, Tacoma. Free. Instructor: Bob Brooks. Participants will learn to rate any of the pavements commonly found in Washington. The rating values obtained using the definitions and methods learned in this course should compare favorably with those obtained and used in the Washington State Pavement Management System. Each participant should be able to perform a pavement condition survey with reasonable objectivity.

Environmental Overview Workshop (LAG Program)

September 9, Mount Vernon; September 15, Tumwater; September 22, Vancouver; September 29, Port Angeles; October 5, Spokane; October 6, Moses Lake; October 27, Seattle; November 3, Richland. Free. Instructors: Highways and Local Programs Environmental staff. This course will give a basic

understanding of environmental procedures and documentation, when they apply, what they are, and how to properly fill out the paperwork. Specific topics will include: Informal and Formal Consultation for Endangered Species Act issues, Memorandums of Agreement for Adverse Cultural/Historical Effects, Programmatic Section 106 Exemptions, Tribal Section 106 Relations and Traditional Cultural Properties, 4(f) Evaluations, guidance on air quality, noise impacts, environmental justice, Environmental Assessments, and Environmental Impact Statements. The course is for local agency staff or consultants who are responsible for environmental procedures and documentation of projects.

Purchasing, Bidding and Contract Management for Local Agencies

September 23, Bellingham; October 19, APWA Conference, Kennewick; November 16, Vancouver; December 14, Lacey. \$50. Instructors: John Carpita, MRSC, and Nancy Woods, City of Lynnwood. Topics to be discussed are:

- **Purchasing:** Policies and Procedures; Types of Purchases; Vendor Lists; Supplies, Materials and Equipment; Services; Consultant Services.
- **Small Public Works Projects:** Small Works Rosters and Procedures; RFPs Versus Bids; Contract Documents and Contract Administration.
- **Public Works Projects:** To Bid or Not to Bid; An Ounce of Prevention; Procedures, Checklists and Files; Contract Documents; Contract Administration; Insurance Issues; Retainage and Bonding; Sales and Use Tax Issues; Contract Administration and Closeout.
- **Labor and Industries:** Prevailing Wage Issues; Contractor Licensing, Bonding and Insurance Requirements.

The October 19 session will be presented as a pre-conference workshop at the APWA Conference in Kennewick, WA. To register for this class, please follow the usual procedure for registering on-line for a WST2 class. You will also need to state on your conference registration form that you will be attending this session. Do not send your class fee with your conference registration; you will be billed after the class, by the WST2 Center.

Appraisal Review Overview (LAG Program)

September 28-29, Kelso. \$100. Instructors: WSDOT and FHWA Real Estate staff. Eminent domain appraisal review for projects using federal highway dollars is a narrow specialty within the appraisal and right of way profession. Many individuals performing these duties do so on an occasional or part-time basis. This day and a half course addresses part of the training needs of this specialized assignment. The course schedule includes:

- Appraisal expectations outlined in The Uniform Act (Uniform Relocation Assistance and Real Property Acquisition Policies Act).
- Local Agency Guidelines concerning appraisal (LAG Chapter 25).
- Eminent Domain Law, R/W plans, and the Uniform Act - Short Case Studies.
- Appraisal Review Overview.
- Recurring Appraisal Review Issues and Case Studies.
- Resources for Eminent Domain Appraisers and Review Appraisers.

Contract Specification Writing (LAG Program)

September 29, Shoreline; October 13, Bellingham; November 9, Tumwater. \$50. Instructor: Steve Boesel. This class will provide guidance and methods for writing consistently clear, concise, complete, and well formatted contract special provisions. It will provide a thought process that can be used when writing or reviewing contract specifications to ensure the greatest possibility for a successful bid and a successful construction project.

Cultural Resources Training

October 5-8, The Dalles, OR. \$350. Cultural Resources training takes place twice a year in the spring and fall. This training will introduce participants to the value and significance of Washington's irreplaceable cultural resources. This class provides an exceptional opportunity for local agencies to work with the Northwest's most qualified instructors, visiting some of the area's finest examples of cultural resources, and attending the only statewide training session of this caliber. There will be presentations by Native Americans on their cultural perspective; speakers on state archaeology, prehistory of Washington, Native American ethnobotany, prehistoric stone artifacts, rare plants, and logging in the northwest; and presentations on federal and state cultural resource regulations and

how they apply to your agency. There will be in-field lessons on learning how to "read" the landscape and recognize the probable cultural resources located at the site, and a sharing of preservation techniques and strategies. This course is for any individual who wants to become knowledgeable about cultural resources and possess the necessary skills to address basic resource management problems associated with cultural resources. Call the WST2 Center to have your name placed on a wait list; this class is not available for on-line registration.

Writing Skills*

November 22-23, Shoreline. \$110. Instructor: Jordan Peabody. A two-day workshop designed to reduce the confusion caused by the poorly written word. Anyone who must write on the job, but is not a writing pro, will find the training both pleasant and helpful. Writing techniques apply to: letters, manuals, speeches, memos, newsletters, e-mail, proposals, reports, bulletins, and minutes.

Access Management, Location & Design

November 30 – December 2, Shoreline. \$400. This is a National Highway Institute class. The course covers access management along streets and highways. General benefits, as well as the social, economic, political, and legal implications of access control are examined. Existing access management practices and policies from states and jurisdictions are used as examples of what types of programs have been implemented and how effective they have been. Through in-depth discussion, access management techniques and the warrants for their use are reviewed. Guidelines for design and application of these access management techniques are described in detail. Strategies for developing and implementing retrofit programs to improve existing access control are presented.

Construction Documentation

December 7, Wenatchee; January 11, Bellingham; January 12, Shoreline; February 2, Vancouver; February 15, Port Angeles; February 16, Tacoma; March 15, east Seattle; March 16, south Seattle; October 25, Spokane; December 13, Shoreline; December 14, south Seattle. Free. Instructor: Ken Hash, WSDOT SW Region Engineer. Regional Local Program Engineers will be in attendance at each class to answer questions. This course covers three phases: pre-contract, contract, and post-contract documentation of public works projects with FHWA funding. Local agency and contractor's documentation is discussed, with a strong emphasis on the documentation requirements of the field inspector. On completion of this

course, participants will have a working knowledge of: (1) required documentation that will be submitted by the contractor, (2) required documentation for acceptance of contract materials, (3) daily inspector's documentation of the contract work, and (4) source documentation for the monthly progress payment to the contractor.

Introduction to GPS Mapping Grade Equipment

\$325. Instructor: Max Schade. This is a three-day, special-request class. Sessions can be scheduled in the WSDOT Olympic Region training room in Tumwater, WA or scheduled in your agency. Fee is based on four students per session. This is an introductory course on mapping grade GPS equipment and is taught by a Trimble-certified instructor. It is designed to provide basic knowledge and skills in the use of GPS technology in mission planning, data gathering, and data processing. The training will enable field operations personnel to use new methods and Trimble mapping grade equipment, as well as understand problems encountered when using the GPS satellite constellation.

AASHTO Roadside Design Guide, Web Based Training

NHI Course Number: 380032C

This web-based course is approximately 14 hours long and is available anytime – 24 hours, 365 days a year via the Internet. The cost for non-FHWA employees is \$230 per participant and includes a copy of the 2002 AASHTO "Roadside Design Guide." This course provides an overview of the 2002 AASHTO "Roadside Design Guide." Emphasis is on current highway agency policies and practices. Participants must register online at <http://www.nhi.fhwa.dot.gov/registerdl.asp>

Computer Requirements: You will need a fairly recent version of a browser (such as Internet Explorer 4 or 5 or Netscape 4 with JavaScript enabled), the latest version of Macromedia Shockwave and Flash (which you can download from the Internet), and a connection to the Internet (at least 56K modem). An older computer such as a Pentium 100 would work, but it would be slower than a Pentium III. For more information, visit <http://www.nhi.fhwa.dot.gov>

The Endangered Species Act (ESA) Training Program

USNMFS Approved Regional Road Maintenance ESA Training Program

The U.S. National Marine Fisheries Service (NMFS) approved the Regional Road Maintenance ESA Training Program on August 15, 2003. This approval applies to agencies that have submitted applications and completed all ten program elements, including this training.

As of June 30, 2004, over 2,000 maintenance supervisors, engineers, environmental staff, leads, and crewmembers have been trained since the start of the program in the spring of 2002. The initial series of classes was presented primarily for agencies that had committed to the Regional Road Maintenance Program (RRMP) and had submitted a "Part 3 Application." The training is now available for any agency requesting it. The goal of the training program remains to serve all maintenance personnel wanting to expand or improve their roadway maintenance knowledge and skills and learn how to apply the latest recommended Best Management Practices (BMPs) for roadway maintenance activities. These BMPs are applicable and recommended for roadway maintenance activities on any roadway. Much of the training to date has been in western Washington. The first courses offered east of the Cascades were presented in June 2004. We are currently developing a statewide schedule and will be adding classes and new locations throughout the 2004-2005 program year. We will be scheduling classes for any agency or organization that desires the training. See contact information below.

The courses in the program focus on maintenance engineering, environmental science, and most importantly, the BMPs in roadway maintenance. BMPs include processes and principles of erosion and sedimentation control, protection of disturbed areas from storm water runoff, stabilization of disturbed areas, methods for minimizing runoff velocities, retention of sediment on the site, and inspection and maintenance of BMPs. The training includes both classroom and field courses. Some topics covered are BMP selection, installation, testing, effectiveness analysis, and removal, where appropriate.

A major program innovation has been realized with the addition of the new course, Track 3F - Road Maintenance Crew Training in the Field Environment: Applying Maintenance BMPs. This field course was first offered in collaboration with WSDOT during early spring of 2004, and so far, over 550 field crewmembers, leads, and supervisors have been trained. The course is available to agencies statewide. This course has become the basic course for field crew training but is applicable for any roadway maintenance personnel who may want actual hands-on experience in the application of the recommended BMPs. For more information regarding the course, contact Jim McManus or Julie Smith. See contact information on page 35.

ESA Training Tracks

Tracks 2, 3, and 4 are part of the Training Plan.

- **Track 1: Briefing for Regional Decision Makers**
2 hours. No fee. This track is an overview of the ESA program for regional level management and administration. This is a stand-alone training class and not part of the required training program. It is offered by members of the Regional Road Maintenance Forum. Call Roy Harris or Gerry Crum at (425) 257-8800 for information. Information may also be obtained from Janine Johanson, METRO KC, at (206) 205-7101.
- **Track 2: Introduction, Design and BMPs, Monitoring, and Environmental Roles for Engineering, Technical and Scientific Staff**
1.4 CEUs. Tuition is \$225 for local agency employees in Washington State, \$400 for others. This two-day course is designed for engineering, biological, and environmental staff, managers, and crew supervisors and leads involved in field maintenance activities. The course provides an introduction to the program guidelines, design, habitat, the ten program elements, and maintenance BMPs to meet ESA requirements.
- **Track 3: Classroom Introduction to ESA and Outcome-based Road Maintenance for Field Crews**
0.7 CEUs. Tuition is \$165 for local agency employees in Washington State, \$375 for others. This one-day course is appropriate for leads and field crewmembers involved in maintenance activities. It provides an introduction to the program guidelines, design, habitat, environmental roles, the ten program elements, and implementation of maintenance BMPs to meet ESA requirements.

■ **Track 3F: Road Maintenance Crew Training in the Field Environment: Applying Maintenance BMPs** 0.7 CEUs. Tuition is \$125 for local agency employees in Washington State, \$175 for WSDOT employees. This one-day course is for maintenance supervisors, crew leads, and crewmembers. This is the newest addition to the training program and is conducted in a field setting. Teams of maintenance crews construct, test, and assess the effectiveness of a variety of erosion and sediment control BMPs. Participants have an opportunity to see multiple BMPs in use and apply installation information for each BMP category to capture, contain, reduce, or minimize flows to minimize or contain erosion and sediment at the site.

■ **Track 4: Train-the Trainer for The Regional Road Maintenance Program** 1.4 CEUs. Tuition is \$240 for local agency employees in Washington State, \$375 for others. This two-day course has been designed specifically for agency-selected ESA trainers. It focuses on training skills and techniques, and evaluates, prepares, and certifies candidates to teach the Regional Road Maintenance Program classroom training (Tracks 2 and 3) and field demonstrations of BMP installations.

The University of Washington's Transportation Professional Development Program in the Department of Civil and Environmental Engineering coordinates and presents the training program in collaboration with the WSDOT Highways & Local Programs WST2 Center and the Regional Road Maintenance ESA Program Training Subcommittee. Questions regarding course content should be directed to Jim McManus, Director of Professional Development, at (206) 543-3747 or jmcman@u.washington.edu. For scheduling of classes, course registration, or information on hosting a class at your agency, please contact Julie Smith, Program Coordinator, at (206) 543-5539, toll-free at (866) 791-1275 or by e-mail at jsmith@engr.washington.edu. Program and registration information can also be found at <http://www.engr.washington.edu/epp/esa/reginfo>.



TRANSPEED

University of Washington

Contact: Christy Pack
(206) 543-5539, toll free 1-866-791-1275
fax (206) 543-2352
<http://www.engr.washington.edu/epp>

To register for a class in this section, use the contact listed above.

Basic Highway Capacity for Engineers and Planners

August 30-September 1, Lacey. \$320/\$520

Work Zone Traffic Control Plan (TCP) Design

September 8-10, Vancouver; December 7-9, Seattle.
\$370/\$570

Access Management

September 20-22, Seattle. \$320/\$520

Legal Liability for Transportation Professionals

September 28-29, Lacey. \$270/\$450

Managing Scope, Schedule and Budget

September 29-October 1, Spokane. \$685/\$885

Technical Communication for Transportation Professionals

October 7-8, Vancouver. \$300/\$500

Administering Consultant Contracts

October 12, Seattle; November 30, Lacey. \$175/\$320

Fundamentals of Traffic Engineering

October 13-15, Lacey. \$355/\$555

Traffic Signal Timing

October 19-20, Seattle. \$300/\$500

Hydrology and Basic Hydraulics

October 21-22, Lacey. \$270/\$450

Roadway Culvert Hydraulic Design

October 25-26, Spokane. \$270/\$450

Traffic Signal Design

October 27-29, Lacey. \$420/\$605

Roundabout Design Concepts and Guidelines

November 3-5, Vancouver. \$420/\$605

Managing Consultants

November 4, Seattle. \$485/\$650

Introduction to Retaining Wall Type Selection and Layout

November 9, Vancouver. \$175/\$300

Public Works Construction Project Management

November 18-19, Seattle. Course revised with new instructor. \$370/\$520

Pavement Rehabilitation

December 1-3, Lacey. \$320/\$520

Manual on Uniform Traffic Control Devices (MUTCD)

December 13-15, Seattle. \$320/\$520

Measuring Project Performance

December 16, Seattle. New course with web-based component. \$470/\$675

Managing Environmental Impact for Design and Construction

January 5-6, Seattle. New Course. \$385/\$600

Engineering Professional Programs (EPP) University of Washington

Contact: Emily West
(206) 543-5539, fax (206) 543-2352
<http://www.engr.washington.edu/epp>

To register for a class in this section, use the contact listed above.

Engineering Refresher Courses

Three evening courses provide thorough preparation for state of Washington engineering examinations.

- **Fundamentals of Engineering Exam Review/ E.I.T.**
September 8-October 18, 2004. \$495
Mondays and Wednesdays, 6:30 to 9:00 p.m.
- **Mechanical Engineering Review Course**
September 14-October 21, 2004. \$645
Tuesdays and Thursdays, 6:30 to 9:00 p.m.
- **Civil Engineering Review Course**
September 14-October 19, 2004. \$495
Tuesdays and Thursdays, 7:00 to 9:30 p.m.

Professional Engineering Practice Liaison (PEPL) University of Washington

Contact Stephanie Storm
(206) 543-5539, fax (206) 543-2352
<http://www.engr.washington.edu/~uw-epp/>

To register for a class in this section, use the contact listed above.

Stormwater Treatment by Media Filtration

October 6-7, Seattle. \$535 by September 22/
\$575 thereafter

Improving Stormwater Management Using Low Impact Development (LID) Practices

October 26-27, Seattle. \$475 by October 12/
\$510 thereafter

Biofiltration and Biorention for Stormwater Runoff Quality Enhancement

November 2, Seattle. \$310 by October 19/
\$345 thereafter

Wetland and Upland Habitat Restoration Design

November 16-17, Seattle. \$475 by November 2/
\$510 thereafter

Field Trip: Wetland and Upland Habitat Restoration Design

November 18, Seattle. \$145

Writing for Success

Five sessions: October 12, 14, 19, 21, 26. University of Washington, Seattle. \$425 by September 28/
\$480 thereafter

Mentoring and Coaching Workshop

December 6, Seattle. \$310 by November 22/
\$345 thereafter

Effective Project Negotiation Skills

December 7, Seattle. \$310 by November 23/
\$345 thereafter

Project Leadership Workshop

February 2-3, Seattle. \$655 by January 19/
\$685 thereafter

Conferences

Associated General Contractors (AGC)

Contact Beth Sachse
(206) 284-4500, fax (206) 284-4595
bsachse@agcwa.com
<http://www.constructionfoundation.org>

To register for a class in this section, use the contact listed above.

Construction Site Erosion and Sediment Control Certification

These WSDOT approved classes are presented by the AGC Education Foundation and available on the following dates:

September 10, Seattle; October 15, Tacoma;
November 9, Everett; November 19, Renton;
December 7, Bellingham.

- Recertification requires attendance on Day 1 only, successfully completing exam, and proof of previous WSDOT certification. Cost: \$200
- Certification training lasts a day and a half and requires successfully completing end of course exam. Cost: \$275

2004 Road and Street Maintenance Supervisor's School

East: October 5-7, 2004, Mirabeau Park Hotel, Spokane.
West: December 8-10, 2004. DoubleTree, Bellevue.
For more information, contact Michelle Johnson, Washington State University, at 1-800-942-4978.

Northwest Pavement Management Association (NWPMA) Fall Conference

October 18-21, 2004, Sheraton Hotel, Tacoma.
For more information, see box below.

APWA Washington State Chapter Conferences – Fall 2004

October 19-22, 2004, Kennewick.

For more information, please contact Bill Goodwin at (425) 741-5026.

- 2005 Conference Dates: April 12-15, 2005, Tacoma
October 4-7, 2005 Yakima

Contact Dick McKinley at (360) 676-6961 for information about the 2005 conferences.

Infrastructure Assistance Coordinating Council (IACC) "The Bucks Start Here"

November 2-4, Wenatchee Conference Center.

For more information, contact Bill Cole, Public Works Board, at (360) 586-4125.

Road Builders' Clinic

March 1-3, 2005, Coeur D'Alene Resort, Idaho.

For more information, contact Washington State University, at 1-800-942-4978 or <http://capps.wsu.edu>.

2004 Fall Pavement Management Conference 'Government and Private Agencies Working Together for Better Pavements'

October 18th – 21st, 2004
Sheraton Tacoma Hotel
Tacoma, Washington

Interested agencies should contact Vicki Griffith at (360) 336-9333 ext. 1-3139 or get information on-line at <http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology/Conf.html>

Conference Sponsorships Offered

If your company is interested in attending, please consider participating at one of our three levels of sponsorship. These levels include having a banner prominently displayed, your company name advertised in the conference agenda, and a vendor space. The Northwest Pavement Management Association is a non-profit association of professional and technical agencies, both public and private, committed to the advancement of pavement management through new and existing technology.

Interested vendors and sponsors should contact Matt Fengler at (253) 591-5060 or mfengler@cityoftacoma.org.





I really mean stop!!! A Camano Island intersection that had been plagued with accidents led to this attempt to get drivers attention. By the way, the intersection was reconstructed in 2003 and one stop sign appears to work just fine now.

Photo from Randy Brackett, Island County.

One of the goals of the WST2 newsletter is to be an electronic publication. You can receive the newsletter electronically by adding your e-mail address to the WST2 Newsletter Listserv at <http://www.wsdot.wa.gov/TA/T2Center/T2HP.htm>, click on WST2 Newsletter under Publications and Software, and then click on T2News List Serve. You can also view the newsletters at the same web address.

If you would like to stop receiving a hardcopy of the newsletter, please e-mail Wendy Schmidt at schmidw@wsdot.wa.gov, and ask to be taken off the hardcopy mailing list.



Sign of the Times

Do you have a humorous traffic sign to share? Send us a print or e-mail a digital image (preferably a 300 dpi, 1000x1500 dpi jpeg or tif) and we will add it to our collection for publishing. Please provide your name, title, agency or company, and a short description of where and when you saw the sign. We want to give you credit for your participation.

You can e-mail the image to schofil@wsdot.wa.gov

Or mail the photo to:
"Sign of the Times"
WST2 Center
PO Box 47390
Olympia, WA 98504-7390

Please don't send your original photo. Although we will do our best to return the photo, we can't guarantee it.

Mousetrap Registration

Name of Invention: _____

Agency: _____ (WSDOT) Region: _____

Mailing Address: _____

City: _____ State _____ Zip+4: _____

Contact Person: _____

E-mail Address: _____

Phone: () _____ Fax: () _____

Inventor(s)/Fabricator(s): _____

E-mail Address: _____

Phone: () _____ Fax: () _____

Supervisor's Name: _____

What prompted this invention (or equipment modification)?

How was it developed?

Labor, Equipment, Materials Used (from scrap pile? Did you purchase any parts?:

Cost Estimate (a rough guess will do):

Benefits to your operations:

Include sketches or plans of your "Better Mousetrap" with dimensions and materials identified, and photographs of the item from all angles (front, top, side, etc.) with the inventors if possible, to:

Build a Better Mousetrap
WSDOT-WST2 Center
PO Box 47390
Olympia, WA 98504-7390

For more information and photos of Mousetraps and Expo, check the Washington State T2 Center's web page:
www.wsdot.wa.gov/TA/T2Center/t2hp.htm
or contact Wendy Schmidt at (360) 705-7386 for details.

You can now register your Mousetrap online at: <http://fmapps.wsdot.wa.gov/mousetraps/Register.htm>



Washington State Technology Transfer Center
WSDOT – H&LP Division
P.O. Box 47390
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